lines along which future investigation should lie, especially in view of the fact that KENDALL succeeded with lower percentages of alcohol in bringing down a different type of precipitate. This latter precipitate might be expected to yield cytolytic enzymes. He also finds a reduction in the sugar content of abscission zones following cell separation, and that the normal acidity on *Nicotiana* pedicels is low and is only slightly reduced during abscission. This latter fact is taken to indicate that the activity of enzymes alone is responsible for the dissolution of the middle lamellae during cell separation.

KENDALL reports that illuminating gas and laboratory air will cause abscission in the majority of the species investigated, but that resistance to abscission stimulated in this manner appears suddenly in some species. Tests were also made as to the effect of a variety of mutilations of the flower and pedicel in inducing abscission. Relatively slight injuries to the ovary were effective, whereas considerable amounts of tissue had to be removed in the case of other flower parts before abscission was induced. It is interesting to note that mechanical injury was not found to be particularly effective in the tomato, and that the following species rarely or never exhibit floral abscission: *Nicotiana Bigelovii* (3 varieties), *N. quadrivalvis* (2 varieties), *N. multivalvis*, *Petunia hybrida*, *Salpiglossis sinuata*, *Salpichora rhomboidea*, and *Lycium australis*. A detailed summary of the pertinent literature is included in KENDALL'S paper. —T. H. GOODSPEED.

Nitrates in forest soils and forest regeneration.—In an important contribution HESSELMAN[23] has reviewed the present state of our knowledge of the composition of forest soils and finds, among other things, that while from earth containing relatively little humus it has been possible to isolate organic compounds of known composition the humus of many soils is composed largely of chemical compounds of undetermined character, but that on the whole the constituents are colloidal in nature and are largely influenced by the amount of mineral salts in the soil and ground water. He distinguishes two types of forest humus soils, the "mild humus" characteristic of deciduous forests, well aerated and containing nitrate-forming as well as denitrifying bacteria, and "raw humus" found in coniferous forests as a series of layers of leaves and litter in various stages of decomposition from which nitrate-forming and denitrifying bacteria are usually absent.

Recognizing decomposing litter as one of the principal sources of nitrogen in forest soils, he has investigated the "decay capacity" of various forest types, using several different methods. He has determined the relative abundance of various bacteria, the nitrogen content of trees and plants, and has shown that nitrate supply and nitrate formation is at its maximum in beech forests and at its minimum in mossy coniferous stands. Lime in the soil and in solution

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[23] HESSELMAN, HENRIK, Studier över saltpeterbildningen i naturliga jordmåner och dess betydelse i växteekologiskt avseende (with abstract in German). Meddel. från Statens Skogsförsöksanst. Haft. 13–14. 297–527. *pls.* 7. *figs.* 30. 1917.

in the ground water tends to promote nitrification. He points out that by proper forest management the formation of nitrates may be accelerated and a decided increase in timber production obtained.

In a second article[24] he investigates the problems of the regeneration of conifer forests, with particular reference to the transformation of nitrogen, for it appears that while trees of pine and spruce often grow in forests where no nitrate formation is taking place, the raw humus developed beneath their dense shade does not prove a good soil for the rapid growth of their seedlings. It seems from experimental evidence that nitrogen transformation in such soils may be initiated and accelerated by the introduction of light through cutting, by burning the surface, or by stirring the surface soil. Decaying timber seems to favor nitrogen transformation, and this may tend to account for the observed abundance of conifer seedlings growing upon fallen logs.

In mixed conifer stands, especially where the herbaceous undergrowth is good, nitrate formation is, in contrast, rather active; so much so in many instances as to induce such a rank growth of herb and grass vegetation in clearings as to crowd out conifer seedlings. These and other data should help to explain to the ecologist many phenomena of secondary succession, while from the same data the forester should receive guidance for the formulation of a policy of forest management that will favor the formation of the amount of nitrogen best suited to the regeneration of the forest.

The value of these excellent papers is increased by an abundance of tabulated data, by being freely illustrated, and by extensive bibliographies.—GEO. D. FULLER.

Mechanics of movement in insectivorous plants.—Two recent papers on this subject, by BROWN[25] and by HOOKER,[26] have supplied some interesting information. Although different plants were used, the results are comparable in many respects. Both investigators find that the bending is accompanied by an extension of the cells on the convex side, which soon becomes fixed by growth; that there is little or no change of size in the cells of the concave side; and that unbending is accompanied by growth on the concave side. HOOKER finds the osmotic pressure of the cells on the convex side of bending tentacles less than that on the concave side, and this decrease is proportional to the increase in the length of the cells. He finds no changes in permeability and concludes that the increased size of the cells is due to decreased elasticity of the cell walls.

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[24] HESSELMAN, HENRIK, Om våra skogsföryngringsåtgärders inverkan på saltpeterbildningen i marken och dess betydelse för barrskogens föryngring (with abstract in English). Meddel. från Statens Skrogsforsöksanst. Haft 13–14. 923–1076. *pls. 15. figs. 48.* 1917.

[25] BROWN, WM. H., The mechanism of movement and the duration of the effect of stimulation in the leaves of *Dionaea.* Amer. Jour. Bot. **3**:68–90. 1916.

[26] HOOKER, HENRY D., JR., Mechanics of movement in *Drosera rotundifolia.* Bull. Torr. Bot. Club **44**:389–403. 1917.